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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
LI, SHI K	

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 03/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/735,574	YOO, SUNG-JOO BEN	
	Examiner	Art Unit	
	Shi K. Li	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17 and 21-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 21-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 4 and 15-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Johnston (U.S. Patent Application Pub. 2003/0016671 A1).

Regarding claim 4, Johnston teaches in paragraph [0014] that in a WDM network with N wavelengths, wavelengths 1 to N-1 are used for data and wavelength N (control wavelength) is used for control as illustrated in FIG. 1. The data frames of Johnston are equivalent to data packets of instant claim (see paragraph [0008]). That is, Johnston teaches to send signaling information for a first frame in control wavelength and the first frame in wavelength 1. Also Johnston teaches in FIG. 1 that the control frame is ahead of the corresponding data frame by a time interval of one frame. Johnston teaches in FIG. 4 to spatially switch frame without converting it to electrical form.

Regarding claim 15, label portion of instant claim is equivalent to control information of Johnston.

Regarding claim 16, Johnston teaches in FIG. 4 input fibers and output fibers.

3. Claims 12-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Sotom et al. (U.S. Patent 5,896,212).

Regarding claim 12, Sotom et al. discloses in FIG. 1 a WDM network comprising a number of nodes. Each node sends packets to the network controller with packets in one of a plurality of data wavelengths (channels) and control information (label portion of instant claim) in a control wavelength (signal wavelength of instant claim). The network controller detects the control information and controls a space switch for switching data packets according to the control information.

Regarding claim 13, Sotom et al. teaches in lines 26-27 optical fibers for connecting nodes of the WDM network.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-2, 14 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sotom et al. (U.S. Patent 5,896,212) in view of ITU-T G.692 (ITU-T G.692, "Optical Interfaces for Multichannel Systems with Optical Amplifiers", October 1998, pp. 14-16).

Sotom et al. discloses in FIG. 1 a WDM network comprising a number of nodes. Each node sends packets to the network controller with packets in one of a plurality of data wavelengths (channels) and control information (signaling signal of instant claim) in a control wavelength (signal wavelength of instant claim). The network controller detects the control

information and controls a space switch to switch data packets according to the control information. Regarding claims 1 and 14, the difference between Sotom et al. and the claimed invention is that Sotom et al. does not teach that the data wavelengths and the control wavelength are in two different transmission band. ITU-T G.692 teaches in Annex A wavelength assignment for data channels and in Annex B wavelengths for the optical supervisory channel (OSC). The data channels are in the range of 1529 nm to 1561 nm. This is usually referred to as the 1550 nm band. See, e.g., Bartee ("Digital Communications" Edited by Thomas Bartee, SAMS, 1986, pp 8-11). The OSC can be of wavelength 1480 nm or 1310 nm. One of ordinary skill in the art would have been motivated to combine the teaching of ITU-T G.692 with the WDM network of Sotom et al. because conformance to international standard ensures compatibility and interoperability between equipment and facilities. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use 1550 nm band for data and 1310 nm band for control information, as taught by ITU-T G.692, in the WDM network of Sotom et al. because conformance to international standard ensures compatibility and interoperability between equipment and facilities.

Regarding claim 2, Sotom et al. teaches in FIG. 2 that a first node sends first packet on data wavelength $\lambda 1$ and a second node sends packet on $\lambda 2$, etc. All nodes send control information via the control wavelength λc.

Regarding claim 25, ITU-T G 692 teaches to use 1310 nm for control wavelength and 1550 nm for data wavelengths.

6. Claims 1-2, 5-6, 17, 21-23 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnston (U.S. Patent Application Pub. 2003/0016671 A1) in view of ITU-T

G.692 (ITU-T G.692, "Optical Interfaces for Multichannel Systems with Optical Amplifiers", October 1998, pp. 14-16).

Johnston has been discussed above in regard to claims 4 and 15-16. Regarding claims 1, 5 and 17, the difference between Johnston and the claimed invention is that Johnston does not teach that the data wavelengths and the control wavelength are in two different transmission band. ITU-T G.692 teaches in Annex A wavelength assignment for data and in Annex B wavelengths for the optical supervisory channel (OSC). The data channels are in the range of 1529 nm to 1561 nm. This is usually referred to as the 1550 nm band. The OSC can be of wavelength 1480 nm or 1310 nm. One of ordinary skill in the art would have been motivated to combine the teaching of ITU-T G.692 with the WDM network of Johnston because conformance to international standard ensures compatibility and interoperability between equipment and facilities. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use 1550 nm band for data and 1310 nm band for control information, as taught by ITU-T G.692, in the WDM network of Johnston because conformance to international standard ensures compatibility and interoperability between equipment and facilities.

Regarding claim 2, Johnston teaches to send signaling information of a second frame in control wavelength and the second frame in another wavelength, e.g., wavelength 2.

Regarding claim 6, ITU-T G.692 also teaches to use 1480 nm for control channel. 1480 nm and 1550 nm are in the same fiber transmission band.

Regarding claims 21-23 and 26, ITU-T G 692 teaches to use 1310 nm for control wavelength and 1550 nm for data wavelengths.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnston and ITU-T G.692 as applied to claims 1-2, 5-6, 17, 21-23 and 26 above, and further in view of Mani et al. (U.S. Patent 6,826,164 B2) and Rowan et al. (U.S. Patent 6,529,303 B1).

Johnston and ITU-T G.692 have been discussed above in regard to claims 1-2, 5-6, 17, 21-23 and 26. The difference between Johnston and ITU-T G.692 and the claimed invention is that Johnston and ITU-T G.692 do not teach to use RF signals for control information. In other words, Johnston teaches to use TDM for multiplexing control information of different data wavelengths while the instant claim uses FDM for multiplexing control information of different data wavelengths. Mani et al. teaches in col. 6, line 61 to col. 7, line 8 that TDM and FDM are equivalent methods for subdividing an optical wavelength into multiple channels. Rowan et al. teaches in FIG. 8, FIG. 9 and FIG. 10 to use frequency division multiplexing technique for combining a plurality of data signals into a single wavelength. For example, Rowan et al. teaches in FIG. 9B to modulate carriers of 576 MHz, 1152 MHz, etc. to combine 8 signals together using FDM technique. One of ordinary skill in the art would have been motivated to combine the teaching of Mani et al. and Rowan et al. with the modified WDM network of Johnston and ITU-T G.692 because FDM technique allows expansion by adding more carriers while expansion for TDM requires changing existing components with components of higher clock rate. Therefore, expanding a FDM system for more channels is easier than expanding a TDM system. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use FDM for multiplexing control information for a plurality of data packets, as taught by Mani et al. and Rowan et al., in the modified WDM network of Johnston and ITU-T G.692 because expanding a FDM system is easier than expanding a TDM system.

8. Claims 7, 9-11 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sotom et al. and ITU-T G.692 as applied to claims 1-2, 14 and 25 above, and further in view of Li et al. (B. Li et al., "Low-Loss 1x2 Multimode Interference Wavelength Demultiplexer in Silicon-Germanium Alloy", IEEE Photonics Technology Letters, Vol. 11, No. 5, May 1999).

Sotom et al. and ITU-T G.692 have been discussed above in regard to claims 1-2, 14 and 25. Regarding claim 7, the difference between Sotom et al. and ITU-T G.692 and the claimed invention is that Sotom et al. and ITU-T G.692 do not teach a multi-mode interference filter for demultiplexing. Li et al. discloses in FIG. 1 a multimode interference (MMI) demultiplexer where WDM signal received from the input port is separated into 1.3 μm and 1.55 μm bands at the two output ports. One of ordinary skill in the art would have been motivated to combine the teaching of Li et al. with the modified WDM network of Sotom et al. and ITU-T G.692 because the device of Li et al. is easy to fabricate and has low insertion losses and high extinction ratio at 1.3 μm and 1.55 μm (p. 575, left col., last sentence). Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the MMI wavelength demultiplexer of Li et al. in the modified WDM network of Sotom et al. and ITU-T G.692 because the device of Li et al. is easy to fabricate and has low insertion losses and high extinction ratio at 1.3 μm and 1.55 μm.

Regarding claims 9 and 24, ITU-T G 692 teaches to use 1310 nm for control wavelength and 1550 nm for data wavelengths.

Regarding claim 10, ITU-T G.692 also teaches to use 1480 nm for control channel. 1480 nm and 1550 nm are in the same fiber transmission band.

Regarding claim 11, Sotom et al. teaches in FIG. 4 buffer memory 15 for delaying data packets before switching.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sotom et al., ITU-T G.692 and Li et al. as applied to claims 7, 9-11 and 24 above, and further in view of Mani et al. (U.S. Patent 6,826,164 B2) and Rowan et al. (U.S. Patent 6,529,303 B1).

Sotom et al., ITU-T G.692 and Li et al. have been discussed above in regard to claims 7, 9-11 and 24. The difference between Sotom et al., ITU-T G.692 and Li et al. and the claimed invention is that Sotom et al., ITU-T G.692 and Li et al. do not teach to use RF signals for control information. In other words, Sotom et al. teaches to use TDM for multiplexing control information for different data wavelengths while the instant claim uses FDM for multiplexing control information for different data wavelengths. Mani et al. teaches in col. 6, line 61 to col. 7, line 8 that TDM and FDM are equivalent methods for subdividing an optical wavelength into multiple channels. Rowan et al. teaches in FIG. 8, FIG. 9 and FIG. 10 to use frequency division multiplexing technique for combining a plurality of data signals into a single wavelength. For example, Rowan et al. teaches in FIG. 9B to modulate carriers of 576 MHz, 1152 MHz, etc. to combine 8 signals together using FDM technique. One of ordinary skill in the art would have been motivated to combine the teaching of Mani et al. and Rowan et al. with the modified WDM network of Sotom et al., ITU-T G.692 and Li et al. because FDM technique allows expansion by adding more carriers while expansion for TDM requires changing existing components with components of higher clock rate. Therefore, expanding a FDM system for more channels is easier than expanding a TDM system. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use FDM for multiplexing control information

for a plurality of data packets, as taught by Mani et al. and Rowan et al., in the modified WDM network of Sotom et al., ITU-T G.692 and Li et al. because expanding a FDM system is easier than expanding a TDM system.

Response to Arguments

10. Applicant's arguments with respect to claims 1-17 and 21-26 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (8:30 a.m. - 5:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

skl
14 March 2005

Shi K. Li
Patent Examiner